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June 30, 2017

Docket Nos.: 50-424
50-425

NL-17-0777
10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant – Units 1 and 2
Flooding Focused Evaluation Summary Report

References:

1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012.
2. NRC Staff Requirements Memoranda, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants," Commission Paper COMSECY-15-0019 (NRC, 2015b), dated June 30, 2015 (ML15153A104).
3. NRC Letter, Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events, dated September 1, 2015.
4. NRC Letter, Vogtle Electric Generating Plant (VEGP), Units 1 and 2 – Supplement to Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanisms Reevaluation (CAC NOS. MF1117 and MF1118), dated November 3, 2015 (ML15300A140).
5. Nuclear Energy Institute (NEI), Report NEI 16-05 Rev 1, External Flooding Assessment Guidelines, dated June 2016.
6. U.S. Nuclear Regulatory Commission, JLD-ISG-2016-01, Revision 0, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flooding Hazard Reevaluation; Focused Evaluation and Integrated Assessment, dated July 11, 2016 (ML16162A301).
7. Southern Nuclear Operating Company (SNC) letter, "Vogtle Electric Generating Plant – Units 1 and 2 Mitigating Strategies Assessment Report," dated December 21, 2016.

Ladies and Gentlemen:

On March 12, 2012, the NRC issued Reference 1, to Southern Nuclear Operating Company (SNC), to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. Following the Commission's directive to NRC Staff in Reference 2, the NRC issued a letter to the industry (Reference 3) indicating that guidance was being prepared to replace previous instructions and provide for a "graded approach to flooding reevaluations" and "more focused evaluations of local intense precipitation and available physical margin in lieu of proceeding to an integrated assessment." NEI prepared the new "External Flooding Assessment Guidelines" in NEI 16-05 (Reference 5), which was endorsed by the NRC in Reference 6.

Reference 4 provided guidance for performing the flooding focused evaluation and integrated assessment for each flood-causing mechanism not bounded by the design basis flood.

Enclosure 1 to this letter provides the Flooding Focused Evaluation Summary for VEGP. This summary evaluated the local intense precipitation (LIP) and combined effects flooding (Probable Maximum Flood (PMF) through Path 2 using the guidance in Nuclear Energy Institute (NEI) 16-05 and utilized Appendix B for guidance on evaluating the site protection features. This concludes all actions for VEGP related to Reference 1 section 2.1. Tracking of the actions from the Reference 7 are documented in Enclosure 2.

Enclosure 2 contains NRC commitments. If you have any questions, please contact Matt Euten at 205.992.7673.

Mr. J. J. Hutto states he is Regulatory Affairs Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

J. J. Hutto
Regulatory Affairs Director

JJH/MRE/GLS

Sworn to and subscribed before me this 30th *day of* June, *2017.*

Notary Public

My commission expires: 1-2-2018

Enclosures: 1. Flooding Focused Evaluation Summary Report for Vogtle Electric Generating Plant
2. VEGP Regulatory Commitments

cc: Regional Administrator, Region II
NRR Project Manager – Vogtle 1 & 2
Senior Resident Inspector – Vogtle 1 & 2
Director, Environmental Protection Division – State of Georgia
RType: CVC7000

Vogtle Electric Generating Plant – Units 1 and 2
Flooding Focused Evaluation Summary Report

Enclosure 1

Flooding Focused Evaluation Summary
Vogtle Electric Generating Plant

(25 pages)

Flooding Focused Evaluation Summary

VOGTLE ELECTRIC GENERATING PLANT
7821 River Rd, Waynesboro, GA 30830
RENEWED FACILITY OPERATING LICENSE NO. DPR-68 & NPF-81

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Version 1.0 – July 21, 2017

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CONTENTS

1. Acronyms

- AB – Auxiliary Building
- APM – Available Physical Margin
- DB – Design Basis
- DFOS – Diesel Fuel Storage Building
- FE – Focused Evaluation
- FFE – Finished Floor Elevation
- FHRR – Flood Hazard Reevaluation Report
- FIAP – Flooding Impact Assessment Process
- FSAR – Final Safety Analysis Report
- KSF – Key Safety Function
- LIP – Local Intense Precipitation
- MSA – Mitigating Strategies Assessment
- MSFHI – Mitigating Strategies Flood Hazard Information
- MSL – Mean Sea Level
- NEI – Nuclear Energy Institute
- NGVD29 - National Geodetic Vertical Datum of 1929
- NRC – Nuclear Regulatory Commission
- NWS - National Weather Service
- NTTF – Near-Term Task Force
- PMF – Probable Maximum Flood
- PMP – Probable Maximum Precipitation
- SM – Shift Manager
- SNC – Southern Nuclear Company
- SSCs – Systems, Structures, and Components
- TDAFW – Turbine Driven Auxiliary Feedwater
- TSA – Time Sensitive Actions
- VEGP – Vogtle Electric Generating Plant Unit1 1&2
- WSE – Water Surface Elevation

2. Executive Summary

The Vogtle Electric Generating Plant (VEGP) has reevaluated its flooding hazard in accordance with Near-Term Task Force (NTTF)'s Rec. 2.1 and Nuclear Regulatory Commission (NRC)'s 10 CFR 50.54(f) Request for Information (Reference 1). The Flood Hazard Reevaluation Report (FHRR) was submitted to NRC on March 5, 2013 (Reference 2) and the NRC agreed with the results of the FHRR for the upstream Dam Failure mechanism. The results are outlined in the Mitigating Strategies Flood Hazard Information (MSFHI) letter dated November 6, 2014 (Reference 3). No changes to the flooding analysis have been performed since the issuance of the MSFHI letter, which served as the input to this Focused Evaluation (FE). The Local Intense Precipitation (LIP) flood causing mechanism received comments from the NRC in References 3 and 4 that required a significant update to the overall flood assessment. The recalculated LIP results are documented in VEGP Calculation X2CA91 Rev. 1 (Reference 5). This was submitted to NRC for review on March 23, 2017. The conclusion of the LIP analysis was that flood waters exceed Plant Design Basis (DB) of 219.1 ft and in some areas reached an elevation of 220.51 ft. The surveyed plant grade was determined to be 219.6 ft.

The Dam Failure Flooding mechanism was evaluated through Path 2 using the guidance in NEI 16-05 (Reference 18). The FE concludes safety-related equipment will remain available for the entire flood event duration and not affect the plant's ability to maintain Key Safety Functions (KSFs). Site topography and grading provides reliable flood protection against the Dam Failure Flood Effects including associated effects, with adequate available physical margin (APM) of 41.5 ft. The site does not require any human actions to protect Key Systems, Structures, and Components so an evaluation of the overall site response was not necessary. This FE follows Path 2 of NEI 16-05, Rev. 1 and utilized Appendix B for guidance on evaluating the site protection features.

For the LIP flood mechanism, an evaluation was performed to determine the volume of water entering buildings housing Key SSCs. Two areas of the plant were found to require temporary flood barriers to prevent any water ingress to these critical buildings. The north Control Building doors and the Unit 2 Diesel Fuel Oil Storage (DFOS) Building penetration were shown to have effective protection and there is an adequate site response to place sand bags in accordance with the Severe Weather Procedure, 11889-C, and Control Room Rounds Sheets, 11874-1. Further validation of these actions per NEI 12-06 Appendix E is pending. The remaining ingress pathways will not allow enough volume of water to enter buildings with Key SSCs and impact these Key SSCs ability to perform their function.

The APM for the LIP mechanism was determined adequate due to the flooding depths against these doors and penetrations are not significantly high enough and the period of inundation is not significantly long enough to challenge the Key SSCs interior to the powerblock buildings through water in-leakage. The APM determined for the lowest Key SSC is the Turbine Driven Auxiliary Feedwater pump in Unit 2 with 2.44 inches of APM. This is the minimum APM for any Key SSC and was determined sufficient due to the conservative assumptions used to calculate the water ingress from various sources. The penetrations identified in the Mitigating Strategies Assessment (Reference 20) may provide a potential pathway for the LIP flood waters to inundate rooms with Key SSCs and FLEX equipment. These penetrations will be further evaluated prior to completing the external flood MSA (reference 20) to ensure that the leakage rate through any existing seals will not impact any Key SSCs or the credited FLEX equipment. If a challenge is identified through this evaluation the penetration will either be sealed or an alternative method of keeping water out of the buildings housing Key SSCs/FLEX equipment will be employed.

3. Background

On March 12, 2012, the NRC issued Reference 1 to. request information associated with NTTF Recommendation 2.1 for Flooding. One of the Required Responses in Reference 1 directed licensees to submit a FHRR. For the VGEP, the FHRR was submitted on March 12, 2013. Per Reference 12, the NRC considers the reevaluated flood hazard to be "beyond the current design/licensing basis of operating plants."

Following the Commission's directive to NRC Staff in Reference 16, the NRC issued a letter to the industry (Reference 17) indicating that new guidance is being prepared to replace instructions in Reference 13 and provide a "graded approach to flooding reevaluations" and "more focused evaluations of local intense precipitation and available physical margin in lieu of proceeding to an integrated assessment". NEI prepared the new "External Flooding Assessment Guidelines" in NEI 16-05 (Reference 18), which was endorsed by the NRC in Reference 19. NEI 16-05 (Reference 18) indicates that for each flood-causing mechanism not bounded by the design basis flood (using only stillwater and/or wind-wave runup) one of the following five assessment paths should be followed:

- Path 1: Demonstrate Flood Mechanism is Bounded (by Improving Realism)
- Path 2: Demonstrate Effective Flood Protection
- Path 3: Demonstrate a Feasible Response
- Path 4: Demonstrate Effective Mitigation
- Path 5: Scenario Based Approach

Non-bounded flood-causing mechanisms in Paths 1, 2, or 3 would only require a Focused Evaluation to complete the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter without the need for the NRC staff to perform Phase 2 decision making per JLD-ISG-2016-01 (Reference 19) and NEI 16-05 (Reference 18). Mechanisms in Paths 4 or 5 require an Integrated Assessment.

4. Flood Hazard Parameters for Unbounded Mechanisms

The NRC has completed the "Staff Assessment" (Reference 3) related to Vogtle Electric Generating Plant's Flood Hazard Reevaluation Report (Reference 2). The initial Staff Assessment agreed with Vogtle's assessment for flooding in streams and rivers, as well as, from failure of upstream dams and on-site control/storage structures. These mechanisms were concluded suitable for the Mitigating Strategies Assessment (MSA) developed to confirm that FLEX is still implementable during the reevaluated flooding mechanisms under Order EA-12-049 and in accordance with NEI 12-06 'Diverse and Flexible Coping Strategies (FLEX) Implementation Guide', Reference 11). Further, the NRC staff has concluded that the licensee's reevaluated flood hazard information is suitable input for the focused evaluations associated with NTTF Recommendation 2.1 "Flooding".

In the same Staff Assessment letter NRC staff identified that the assumption that ponding behind the Vehicle Barrier System (VBS) and subsequent estimations of flood levels in the center of the plant were non-conservative. A "Supplement to Staff Assessment" letter later identified the non-conservative treatment of the grade variation inside the VBS and around the powerblock. The staff left these items as "Open Items" to be address in the Focused Evaluation (FE) (Reference 4). It was identified that these open items needed to be addressed for the MSA, and a full evaluation was provided in Reference 6. This FE will use the same estimated flood depths for LIP as the input for this evaluation.

In Table 3.1-1 of the enclosure to Reference 19, the NRC lists the following flood-causing mechanisms parameters for consideration and comparison against the design basis flood mechanism parameters:

- Local Intense Precipitation;
- Streams and Rivers;
- Failure of Dams and Onsite Water Control/Storage Structures;
- Storm Surge;
- Seiche;
- Tsunami;
- Ice Induced Flooding; and
- Channel Migrations/Diversions.

In Table 4.0-2 of the enclosure to Reference 19, the NRC lists flood hazard information for the following flood-causing mechanisms that are not bounded by the design basis hazard flood level and are evaluated in this Focused Evaluation (FE):

- Dam Failure Flooding
- Local Intense Precipitation

Per Note 2 of Table 2, Enclosure 1, Reference 19, "reevaluated hazard mechanisms bounded by the current design basis are not included in this table."

The PMF for the Dam Failure Flooding mechanism is based on Section 2.4.4, Dam Failures, of the VEGP, Units 3 and 4 final safety analysis report (FSAR) (Reference 21) to represent the reevaluation of dam failure flood for VEPG, Unit 1 and 2. A more detailed description of this reevaluated flood-causing

mechanism, along with the basis for inputs, assumptions, methodologies, and models, is provided in Reference 2, Enclosure 1, and only a summary of the flood parameters (Table 4-1) will be provided in this document. Due to the calculated Available Physical Margin (APM) of 41.9 ft, only the wind-wave run-up associated effect was included in the FHRR. All additional associated effects were determined irrelevant and were not evaluated because they have no impact to the site.

The LIP mechanism is also based on NUREG/CR-7046 precipitation event described as the 6-hr, 10-mi^2 Probable Maximum Precipitation (PMP) at the plant site. A complete detailed evaluation of this mechanism is provided in Calculation X2CA91 Ver. 1 (Reference 6). This calculation addresses the NRC identified open items in Reference 4 and provides additional information on warning time, period of inundation and period of recession, as well as, the impacts of standing water against the exterior of the Power Block building doors. These calculations were performed to be used as inputs to both the MSA and this FE. Complete calculations can be found in Reference 2, 6, and 20. Only a summary of these results (Table 4-3 and Table 4-4) are provided in this document to justify the conclusions made throughout the evaluation.

Table 4-1: Summary of the Maximum Water Surface Elevations (WSEs) for Flooding from Dam Failure

Flood Causing Mechanism	Current Design Basis WSE (ft NGVD29)	Flood Hazard Reevaluation WSE (ft NGVD29)	Bounded/Not Bounded
Dam Failure Flooding	141.0	166.0	NB
Dam Failure Flooding with Maximum Wave Run-Up	168.0	178.1	NB

The table below provides an overall summary of the LIP mechanisms parameters. All associated effects included in this table were used in the evaluation. Detailed flood inundation, period of inundation, recession and forces affecting each point of interest are included in Table 4-3 and Table 4-4. Table 4-5 summarizes how the non-bounded flooding mechanisms were addressed in this FE.

Table 4-2: Summary of the Maximum Water Surface Elevations (WSEs) for LIP

Flood Scenario Parameter		Plant Current Design Basis	FLEX Design Basis Flood Hazard	LIP Hazard	LIP Hazard Bounded (B) or Not Bounded (NB) by FLEX DB
Flood Level and Associated Effects	Maximum Stillwater Elevation (ft. MSL)	219.1	219.1	220.5 See Note 1	NB
	Maximum Flood Elevation (Maximum Stillwater Elevation + Wave Run-Up) (ft. MSL)	219.1	219.1	220.51 See Note 2	NB
	Maximum Hydrodynamic/Debris Loading (psf)	Not Included	Not Included	See Note 3	NB
	Effects of Sediment Deposition/Erosion	Not Included	Not Included	See Note 4	NB
	LIP associated Effects	Not Included	Not Included	N/A	N/A
	Concurrent Site Conditions	Not Included	Not Included	See Note 5	B
	Groundwater Level	Not Included	Not Included	See Note 6	N/A
Flood Event Duration	Warning Time (hours)	Not Included	Not Included	72	NB
	Period of Site Preparation (hours)	Not Included	Not Included	72 See Note 7	B
	Period of Inundation (hours)	Not Included	Not Included	8.5	NB
	Period of Recession (hours)	Not Included	Not Included	11	NB
Other	Plant Mode of Operations	Not Included	Not Included	All	B
	Other Factors	Not Included	-	-	-

Notes:

1. The maximum flooding elevation is located outside the CST Valve Gallery due to the concrete pad being at approximate elevation of 220.0 ft MSL. Table 4-3 and Table 4-4 present the maximum flooding elevations for various key locations of interest throughout Units 1 and 2.
2. Due to the short duration of the LIP event peak flooding elevation and the short

Flood Scenario Parameter	Plant Current Design Basis	FLEX Design Basis Flood Hazard	LIP Hazard	LIP Hazard Bounded (B) or Not Bounded (NB) by FLEX DB
fetch length that would be associated with a coincident 2-year wind-driven wave, run-up is assumed to have a minimal impact on the water surface elevation in the Power Block Area. 3. The FLEX DB did not consider hydraulic or debris loading due to LIP; therefore, the reevaluated LIP loading conditions are considered not bounded. Further evaluation concludes that the FLEX strategies will not be challenged. The potential debris generation caused by the LIP event will be from unsecured materials located inside the Power Block Area. Good housekeeping practices will minimize the amount of material/debris that can be moved by LIP runoff. 4. The areas with higher velocities associated with the LIP hazard occur on asphalt and/or paved areas. As a result, any adverse site impacts from a LIP event are insignificant. 5. High winds could be generated concurrent to a LIP event. However, the winds associated with a LIP event are anticipated to be less than those evaluated in the current FLEX, which accounts for high winds and debris resulting from a tornado or hurricane. 6. The majority of the plant area is paved or gravel. These land uses would limit the volume of rainfall infiltrated during the 6-hour LIP event and groundwater seepage would likely be minimal. 7. The VGEP Units 1 and 2 11889-C Version 26, and 11874-1 Version 85 specifies that the site will have more than 72 hours, for the preparation of the LIP flood event.				

Table 4-3 : Maximum Exterior Water Surface Elevations, Associated Effects and Depths Above Surveyed Elevation

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Ground Elevation (ft MSL)	Door Sill/ Penetration/ Scupper Elevation (ft MSL)	Maximum Water Surface Elevation (ft MSL)	Maximum Depth (ft)	Time to Peak (hours)	Max Velocity (ft/s)	Max Resultant Impact Load (lb/ft)	Max Resultant Static Load (lb/ft)	Maximum Depth above Surveyed Elevation (ft)
POI-N-C-1	Scupper	North Side of Control Building	108160	219.57	221.25 [B]	220.02	0.45	0.27	0.92	0.94	6.23	0.00
POI-N-C-2	Scupper		108163	219.58	221.25 [B]	220.12	0.54	0.26	0.92	0.78	9.20	0.00
POI-N-C-3	Scupper		108166	219.55	221.25 [B]	220.16	0.61	0.26	1.18	16.17	11.47	0.00
POI-N-C-4	Door		108168	219.41	219.68 [C]	220.15	0.74	0.26	1.20	2.27	17.15	0.47
POI-N-C-5	Door		108170	219.25	219.68 [C]	220.14	0.89	0.34	2.92	29.86	24.76	0.46
POI-N-C-6	Door		108178	219.23	219.67 [C,D]	220.16	0.93	0.33	1.37	3.52	26.97	0.49
POI-N-C-7	Door		108192	219.20	219.70 [C]	220.15	0.95	0.36	1.39	3.79	28.27	0.45
POI-N-C-8	Door		108198	219.22	219.71 [C]	220.12	0.90	0.29	2.01	21.55	25.22	0.41
POI-N-C-9	Door		108199	219.26	219.73 [C]	220.09	0.83	0.29	2.89	28.27	21.65	0.36
POI-N-C-10	Scupper		108203	219.23	221.15 [B]	220.09	0.86	0.29	1.80	21.17	23.28	0.00
POI-N-C-11	Scupper		108206	219.26	221.15 [B]	220.07	0.81	0.29	1.02	1.63	20.27	0.00
POI-N-C-12	Scupper		108209	219.39	221.15 [B]	220.03	0.64	0.29	0.97	1.47	12.75	0.00
POI-E-C-1	Scupper	East Side of Control Building	109876	219.58	221.25 [B]	219.89	0.31	0.08	0.51	0.20	3.00	0.00
POI-E-C-2	Scupper		112378	219.70	221.25 [B]	219.95	0.25	0.08	0.33	0.07	1.94	0.00
POI-E-C-3	Door		118216	219.37	220.50	219.97	0.60	0.08	0.18	0.07	11.25	0.00
POI-W-C-1	Scupper	West Side of Control Building	109823	218.89	221.15 [B]	219.74	0.85	0.08	0.42	0.64	22.53	0.00
POI-W-C-2	Scupper		112325	219.58	221.15 [B]	220.01	0.43	0.08	0.37	0.14	5.65	0.00
POI-W-C-3	Door		116495	219.23	220.50	219.80	0.57	0.08	0.27	0.07	10.17	0.00
POI-S-AUX-1	Door	South Side of Auxiliary Building	139017	219.59	219.74	219.82	0.23	0.08	0.47	0.22	1.61	0.08
POI-S-AUX-2	Door		139859	219.64	219.64	220.06	0.42	0.08	0.78	0.65	5.42	0.42
POI-S-AUX-3	Door		139028	219.58	219.64	219.89	0.31	0.08	0.84	11.63	2.98	0.25
POI-S-AUX-4	Door		139038	219.68	219.68 [A]	219.86	0.18	0.08	0.28	0.03	0.97	0.18
POI-S-AUX-5	Door		139040	219.87	219.87 [A]	220.02	0.15	0.08	0.18	0.01	0.75	0.15
POI-S-AUX-6	Door		139041	220.03	220.03 [A]	220.13	0.10	0.08	0.17	0.01	0.32	0.10
POI-S-AUX-7	Door		140722	219.78	219.78 [A]	220.37	0.59	0.08	1.49	3.27	10.94	0.59

Table 4-3 : Maximum Exterior Water Surface Elevations, Associated Effects and Depths Above Surveyed Elevation

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Ground Elevation (ft MSL)	Door Sill/ Penetration/ Scupper Elevation (ft MSL)	Maximum Water Surface Elevation (ft MSL)	Maximum Depth (ft)	Time to Peak (hours)	Max Velocity (ft/s)	Max Resultant Impact Load (lb/ft)	Max Resultant Static Load (lb/ft)	Maximum Depth above Surveyed Elevation (ft)
POI-S-AUX-8	Door		139055	219.84	220.30	220.39	0.55	0.08	1.19	14.36	9.56	0.09
POI-S-AUX-9	Door		139062	219.36	219.74	220.07	0.71	0.10	2.16	7.17	15.91	0.33
POI-E-AUX-1	Door	East Side of Auxiliary Building	129889	219.22	219.93	219.44	0.22	0.07	0.31	0.09	1.47	0.00
POI-E-AUX-2	Door		134059	219.05	220.30	219.52	0.47	0.08	0.19	0.06	6.78	0.00
POI-E-AUX-3	Door		135727	219.17	221.00	219.56	0.39	0.08	0.65	10.34	4.72	0.00
POI-E-AUX-4	Door		137395	219.17	221.00	219.61	0.44	0.08	0.56	11.81	6.18	0.00
POI-W-AUX-1	Door	West Side of Auxiliary Building	129843	219.30	219.82	219.53	0.23	0.08	0.23	0.04	1.59	0.00
POI-W-AUX-2	Door		134013	219.34	220.30	219.62	0.28	0.08	0.28	0.05	2.53	0.00
POI-W-AUX-3	Door		135681	219.41	221.00	219.71	0.30	0.08	0.55	7.20	2.79	0.00
POI-W-AUX-4	Door		137349	219.49	221.00	219.75	0.26	0.08	0.54	6.26	2.11	0.00
POI-N-DG1-1	Door	North Side of Diesel Generator Building (Unit 1)	119891	219.32	219.93	219.69	0.37	0.08	0.32	0.09	4.33	0.00
POI-N-DG1-2	Door		119895	219.14	219.93	219.65	0.51	0.10	2.06	28.45	8.20	0.00
POI-E-DFOS1-1	Door	East Side of Diesel Fuel Oil Storage Building (Unit 1)	123238	217.95	220.00	219.19	1.24	0.08	0.03	9.01	47.66	0.00
POI-S-DG1-1	Door	South Side of Diesel Generator Building (Unit 1)	129897	219.58	219.93	219.75	0.17	0.08	0.31	0.04	0.92	0.00
POI-S-DG1-2	Door		129902	219.71	219.96	219.91	0.20	0.05	0.37	0.07	1.25	0.00
POI-N-DG2-1	Door	North Side of Diesel Generator Building (Unit 2)	119820	219.56	219.86	219.96	0.40	0.08	1.29	22.35	5.02	0.10
POI-N-DG2-2	Door		119825	219.51	219.86	219.71	0.20	0.08	0.27	0.02	1.20	0.00
POI-W-DFOS2-1	Door	West Side of Diesel Fuel Oil Storage Building (Unit 2)	123149	218.38	219.93	219.33	0.95	0.91	0.68	4.49	28.38	0.00
POI-W-DFOS2-2	Penetration		124817	218.25	219.03	219.33	1.08	1.01	0.82	5.16	36.36	0.30
POI-S-DG2-1	Door	South Side	129825	218.71	219.87	219.31	0.60	0.96	0.78	7.79	11.16	0.00

Table 4-3 : Maximum Exterior Water Surface Elevations, Associated Effects and Depths Above Surveyed Elevation

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Ground Elevation (ft MSL)	Door Sill/ Penetration/ Scupper Elevation (ft MSL)	Maximum Water Surface Elevation (ft MSL)	Maximum Depth (ft)	Time to Peak (hours)	Max Velocity (ft/s)	Max Resultant Impact Load (lb/ft)	Max Resultant Static Load (lb/ft)	Maximum Depth above Surveyed Elevation (ft)
POI-S-DG2-2	Door	of Diesel Generator Building (Unit 2)	129830	219.80	219.88	219.90	0.10	0.08	0.16	0.01	0.28	0.02
POI-N-AFP1-1	Penetration	North Side of Auxiliary Feedwater Pumphouse (Unit 1)	109048	219.07	219.91	219.15	0.08	0.08	1.38	0.36	0.18	0.00
POI-N-AFP1-2	Door		109049	219.57	219.94	219.62	0.05	0.01	1.10	0.15	0.09	0.00
POI-N-AFP1-3	Penetration		109051	219.12	219.92	219.26	0.14	0.08	2.49	2.17	0.63	0.00
POI-E-AFP1-1	Door	CST Valve Gallery Door (Unit 1)	111553	220.00	220.00	220.51	0.51	0.06	0.77	6.51	8.22	0.51
POI-S-AFP1-1	Door	South Side of Auxiliary Feedwater Pumphouse (Unit 1)	117390	219.54	219.89	219.87	0.33	0.08	0.81	1.08	3.42	0.00
POI-N-AFP2-1	Penetration	North Side of Auxiliary Feedwater Pumphouse (Unit 2)	108982	219.01	219.85	219.16	0.15	0.82	1.95	1.38	0.66	0.00
POI-N-AFP2-2	Door		108984	219.51	219.86	219.56	0.05	0.01	0.00	0.00	0.09	0.00
POI-N-AFP2-3	Penetration		108985	219.20	219.89	219.31	0.11	0.08	1.73	0.78	0.35	0.00
POI-W-AFP2-1	Door	CST Valve Gallery Door (Unit 2)	111482	220.00	220.00	220.51	0.51	0.08	0.78	6.41	7.99	0.51
POI-S-AFP2-1	Door	South Side of Auxiliary Feedwater Pumphouse (Unit 2)	117321	219.63	219.88	219.95	0.32	0.08	0.70	0.76	3.18	0.07
POI-NSCT1E-1	Door	Nuclear Service Cooling Water Tower Unit 1 (East)	143241	219.24	219.83	219.42	0.18	0.08	0.29	2.24	0.96	0.00
POI-NSCT1E-2	Scupper		146581	218.53	219.63	219.30	0.77	0.99	0.65	0.51	18.64	0.00
POI-NSCT1E-3	Penetration		147402	219.01	218.87 [A]	219.72	0.71	0.08	1.79	6.32	15.63	0.71
POI-NSCT1E-4	Scupper		149070	218.90	219.63	219.55	0.65	0.08	2.35	8.84	13.13	0.00
POI-NSCT1E-5	Scupper		149084	218.45	219.63	219.32	0.87	0.85	0.42	0.46	23.61	0.00
POI-NSCT1E-6	Scupper		152417	218.47	219.63	219.37	0.90	0.95	1.56	4.99	25.22	0.00
POI-NSCT1E-7	Scupper		153238	218.04	219.63	219.40	1.36	1.00	1.75	5.79	57.38	0.00
POI-NSCT1E-8	Scupper		154081	217.63	219.63	219.36	1.73	0.96	0.89	3.11	93.42	0.00

Table 4-3 : Maximum Exterior Water Surface Elevations, Associated Effects and Depths Above Surveyed Elevation

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Ground Elevation (ft MSL)	Door Sill/ Penetration/ Scupper Elevation (ft MSL)	Maximum Water Surface Elevation (ft MSL)	Maximum Depth (ft)	Time to Peak (hours)	Max Velocity (ft/s)	Max Resultant Impact Load (lb/ft)	Max Resultant Static Load (lb/ft)	Maximum Depth above Surveyed Elevation (ft)
POI-NSCT1E-9	Scupper		154906	217.81	219.63	219.38	1.57	1.00	2.20	8.42	76.95	0.00
POI-NSCT1E-10	Scupper		155743	217.50	219.63	219.38	1.88	1.00	0.85	2.29	110.33	0.00
POI-NSCT1W-1	Penetration	Nuclear Service Cooling Water Tower Unit 1 (West)	148226	218.92	219.83	220.01	1.09	0.09	0.69	13.66	36.89	0.18
POI-NSCT1W-3	Penetration		151551	219.16	218.78 [A]	219.70	0.54	0.08	1.40	4.77	9.15	0.54
POI-NSCT1W-4	Scupper		150732	218.79	219.72	219.87	1.08	0.09	1.36	5.81	36.44	0.15
POI-NSCT1W-5	Scupper		154050	218.94	219.72	219.48	0.54	0.05	1.66	3.61	9.12	0.00
POI-NSCT1W-6	Scupper		154065	218.67	219.72	219.40	0.73	1.01	1.92	11.29	16.72	0.00
POI-NSCT1W-7	Scupper		156564	218.70	219.72	219.36	0.66	1.01	1.44	7.84	13.73	0.00
POI-NSCT1W-8	Scupper		157383	218.31	219.72	219.31	1.00	1.02	0.72	2.34	31.17	0.00
POI-NSCT1W-9	Scupper		159060	218.33	219.72	219.34	1.01	1.01	0.51	0.74	31.52	0.00
POI-NSCT1W-10	Scupper		159885	218.76	219.72	219.31	0.55	1.01	0.34	0.16	9.55	0.00
POI-NSCT1W-11	Scupper		159889	218.65	219.72	219.32	0.67	1.01	0.44	0.44	14.16	0.00
POI-NSCT2E-1	Door	Nuclear Service Cooling Water Tower Unit 2 (East)	148200	218.94	219.81	219.63	0.69	0.09	0.49	8.65	14.79	0.00
POI-NSCT2E-3	Scupper		150699	218.86	219.70	219.35	0.49	0.08	1.31	4.67	7.51	0.00
POI-NSCT2E-4	Penetration		151545	218.00	219.02	219.32	1.32	0.98	1.59	16.49	54.34	0.30
POI-NSCT2E-5	Scupper		153198	218.47	219.70	219.31	0.84	0.98	1.62	3.92	21.93	0.00
POI-NSCT2E-6	Scupper		154044	217.94	219.70	219.31	1.37	0.98	2.56	15.00	58.73	0.00
POI-NSCT2E-7	Scupper		156530	218.17	219.70	219.31	1.14	0.98	2.23	6.98	40.50	0.00
POI-NSCT2E-8	Scupper		157376	217.31	219.70	219.31	2.00	0.97	2.80	26.98	124.70	0.00
POI-NSCT2E-9	Scupper		159031	218.02	219.70	219.33	1.31	0.97	0.53	0.52	53.53	0.00
POI-NSCT2E-10	Scupper		159869	218.25	219.70	219.33	1.08	0.97	0.47	0.42	36.22	0.00

Table 4-3 : Maximum Exterior Water Surface Elevations, Associated Effects and Depths Above Surveyed Elevation

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Ground Elevation (ft MSL)	Door Sill/ Penetration/ Scupper Elevation (ft MSL)	Maximum Water Surface Elevation (ft MSL)	Maximum Depth (ft)	Time to Peak (hours)	Max Velocity (ft/s)	Max Resultant Impact Load (lb/ft)	Max Resultant Static Load (lb/ft)	Maximum Depth above Surveyed Elevation (ft)
POI-NSCT2E-11	Scupper		159872	217.86	219.70	219.32	1.46	0.97	0.74	1.25	66.31	0.00
POI-NSCT2W-1	Door	Nuclear Service Cooling Water Tower Unit 2 (West)	143177	218.77	219.89	219.28	0.51	0.99	0.51	0.17	8.02	0.00
POI-NSCT2W-3	Scupper		145676	218.44	219.68	219.27	0.83	0.99	0.50	0.66	21.56	0.00
POI-NSCT2W-4	Penetration		146523	219.12	219.12 [A]	219.67	0.55	0.08	0.94	7.05	9.61	0.55
POI-NSCT2W-5	Penetration		147357	218.99	218.81 [A]	219.64	0.65	0.08	1.84	8.14	13.06	0.65
POI-NSCT2W-6	Scupper		148178	218.34	219.68	219.28	0.94	1.00	0.70	1.07	27.42	0.00
POI-NSCT2W-7	Scupper		149025	218.79	219.68	219.43	0.64	0.08	2.20	8.05	12.71	0.00
POI-NSCT2W-8	Scupper		151513	218.20	219.68	219.28	1.08	1.00	0.80	0.95	36.56	0.00
POI-NSCT2W-9	Scupper		151526	218.54	219.68	219.29	0.75	0.98	1.16	5.16	17.71	0.00
POI-NSCT2W-10	Scupper		154023	218.14	219.68	219.29	1.15	0.98	1.05	1.09	41.26	0.00
POI-NSCT2W-11	Scupper		154848	218.05	219.68	219.30	1.25	0.99	0.52	0.65	48.41	0.00
POI-NSCT2W-12	Scupper		154852	218.28	219.68	219.30	1.02	0.98	0.46	0.51	32.28	0.00
POI-N-FLEX-1	Door	North Side of FLEX Building	198514	213.92	214.54	214.54	0.62	0.08	1.61	8.77	12.13	0.00
POI-S-FLEX-1	Door	South Side of FLEX Building	210966	212.74	214.35	213.30	0.56	0.24	1.02	7.85	9.95	0.00

[A] Partition wall between alleyway and North Main Steam Valve Room
[B] Control Building doors facing alleyway
[C] Included in the consequential flooding analysis
[D] Location where consequential rainfall first exceeds the door sill or penetration elevation

Table 4-4: Summary of Flood Inundation and Recession Periods

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Surveyed Elevation (ft MSL)	Inundation Period (hours)	Recession Period (hours)
POI-N-C-4	Door	North Side of Control Building	108168	219.68	1.0	0.3
POI-N-C-5	Door	North Side of Control Building	108170	219.68	1.1	5.2
POI-N-C-6	Door	North Side of Control Building	108178	219.67	1.1	1.8
POI-N-C-7	Door	North Side of Control Building	108192	219.70	0.9	1.0
POI-N-C-8	Door	North Side of Control Building	108198	219.71	0.8	5.5
POI-N-C-9	Door	North Side of Control Building	108199	219.73	0.7	5.3
POI-E-C-3	Door	East Side of Control Building	118216	220.50	0.0	9.0
POI-W-C-3	Door	West Side of Control Building	116495	220.50	0.0	6.5
POI-S-AUX-1	Door	South Side of Auxiliary Building	139017	219.74	1.0	5.0
POI-S-AUX-2	Door	South Side of Auxiliary Building	139859	219.64	7.8	0.0
POI-S-AUX-3	Door	South Side of Auxiliary Building	139028	219.64	6.4	.0.1
POI-S-AUX-4	Door	South Side of Auxiliary Building	139038	219.68 [A]	1.1	0.0
POI-S-AUX-5	Door	South Side of Auxiliary Building	139040	219.87 [A]	0.5	0.0
POI-S-AUX-6	Door	South Side of Auxiliary Building	139041	220.03 [A]	0.0	Negligibly Inundated
POI-S-AUX-7	Door	South Side of Auxiliary Building	140722	219.78 [A]	7.2	0.0
POI-S-AUX-8	Door	South Side of Auxiliary Building	139055	220.30	0.3	7.0
POI-S-AUX-9	Door	South Side of Auxiliary Building	139062	219.74	0.7	2.3
POI-E-AUX-1	Door	East Side of Auxiliary Building	129889	219.93	0.0	2.1
POI-E-AUX-2	Door	East Side of Auxiliary Building	134059	220.30	0.0	6.9
POI-E-AUX-3	Door	East Side of Auxiliary Building	135727	221.00	0.0	6.3
POI-E-AUX-4	Door	East Side of Auxiliary Building	137395	221.00	0.0	6.7
POI-W-AUX-1	Door	West Side of Auxiliary Building	129843	219.82	0.0	1.2
POI-W-AUX-2	Door	West Side of Auxiliary Building	134013	220.30	0.0	3.3
POI-W-AUX-3	Door	West Side of Auxiliary Building	135681	221.00	0.0	7.4
POI-W-AUX-4	Door	West Side of Auxiliary Building	137349	221.00	0.0	6.3
POI-N-DG1-1	Door	North Side of Diesel Generator Building (Unit 1)	119891	219.93	0.0	6.1
POI-N-DG1-2	Door	North Side of Diesel Generator Building (Unit 1)	119895	219.93	0.0	7.5
POI-E-DFOS1-1	Door	East Side of Diesel Fuel Oil Storage Building (Unit 1)	123238	220.00	0.0	6.1
POI-S-DG1-1	Door	South Side of Diesel Generator Building (Unit 1)	129897	219.93	0.0	1.1
POI-S-DG1-2	Door	South Side of Diesel Generator Building (Unit 1)	129902	219.96	0.0	1.2
POI-N-DG2-1	Door	North Side of Diesel Generator Building (Unit 2)	119820	219.86	0.1	6.4
POI-N-DG2-2	Door	North Side of Diesel Generator Building (Unit 2)	119825	219.86	0.0	1.1

Table 4-4: Summary of Flood Inundation and Recession Periods

Point of Interest ID	Point of Interest Type	Area	FLO-2D Grid Element Number	Surveyed Elevation (ft MSL)	Inundation Period (hours)	Recession Period (hours)
POI-W-DFOS2-1	Door	West Side of Diesel Fuel Oil Storage Building (Unit 2)	123149	219.93	0.0	3.4
POI-W-DFOS2-2	Penetration	West Side of Diesel Fuel Oil Storage Building (Unit 2)	124817	219.03	0.5	4.8
POI-S-DG2-1	Door	South Side of Diesel Generator Building (Unit 2)	129825	219.87	0.0	6.1
POI-S-DG2-2	Door	South Side of Diesel Generator Building (Unit 2)	129830	219.88	< 0.1	0.2
POI-N-AFP1-2	Door	North Side of Auxiliary Feedwater Pumphouse (Unit 1)	109049	219.94	0.0	Negligibly Inundated
POI-E-AFP1-1	Door	CST Valve Gallery Door (Unit 1)	111553	220.00	6.3	0.0
POI-S-AFP1-1	Door	South Side of Auxiliary Feedwater Pumphouse (Unit 1)	117390	219.89	0.0	6.1
POI-N-AFP2-2	Door	North Side of Auxiliary Feedwater Pumphouse (Unit 2)	108984	219.86	0.0	Negligibly Inundated
POI-W-AFP2-1	Door	CST Valve Gallery Door (Unit 2)	111482	220.00	6.3	0.0
POI-S-AFP2-1	Door	South Side of Auxiliary Feedwater Pumphouse (Unit 2)	117321	219.88	< 0.1	6.1
POI-NSCT1E-1	Door	Nuclear Service Cooling Water Tower Unit 1 (East)	143241	219.83	0.0	1.1
POI-NSCT1E-3	Penetration	Nuclear Service Cooling Water Tower Unit 1 (East)	147402	219.01 [A]	6.2	0.0
POI-NSCT1W-1	Penetration	Nuclear Service Cooling Water Tower Unit 1 (West)	148226	219.83	0.2	10.9
POI-NSCT1W-3	Penetration	Nuclear Service Cooling Water Tower Unit 1 (West)	151551	219.16 [A]	8.4	0.0
POI-NSCT1W-4	Scupper	Nuclear Service Cooling Water Tower Unit 1 (West)	150732	219.72	0.3	0.9
POI-NSCT2E-1	Door	Nuclear Service Cooling Water Tower Unit 2 (East)	148200	219.81	0.0	7.5
POI-NSCT2E-4	Penetration	Nuclear Service Cooling Water Tower Unit 2 (East)	151545	219.02	1.3	7.8
POI-NSCT2W-1	Door	Nuclear Service Cooling Water Tower Unit 2 (West)	143177	219.89	0.0	2.4
POI-NSCT2W-4	Penetration	Nuclear Service Cooling Water Tower Unit 2 (West)	146523	219.12 [A]	6.1	0.0
POI-NSCT2W-5	Penetration	Nuclear Service Cooling Water Tower Unit 2 (West)	147357	218.99 [A]	6.5	0.0
POI-N-FLEX-1	Door	North Side of FLEX Building	198514	214.54	0.0	6.4
POI-S-FLEX-1	Door	South Side of FLEX Building	210966	214.35	0.0	2.1

Table 4-5: Summary of Flood Impact Assessment for Non-Bounded Flooding Mechanisms

	Flood Mechanism	Summary of Assessment
1	Dam Failure Flooding with wind/wave runup	This mechanism will follow Flooding Impact Assessment Process (FIAP) Path 2, as described in Table 6.3 of NEI 16-05, based on the reevaluated flood levels being below grade of the Power Block with no impact to key SSCs. Flooding mechanism parameters are not being revised as part of the FIAP.
2	Local Intense Precipitation	This mechanism, as documented in the VEGP FHRR (Reference 2), and in the more detailed analysis in the calculation X2CA91 and the MSA (Reference 4). Flood water from LIP is expected to be above several doors, penetrations and scuppers that could lead to flooding in buildings of the PowerBlock that contain Key SSCs. VEGP will deploy temporary barriers around several ingress pathways for the flood water to ensure that a significant amount of water does not accumulate interior to the plant affecting Key SSCs. Therefore, this evaluation will follow Path 2, as described in Table 6.3 of NEI 16-05. Effective mitigation will be relied upon for maintaining APM from the flood waters to the lowest elevation of Key SSCs. VGEP has committed to further evaluating the penetrations identified in Reference 20 as providing a potential pathway for the LIP flood waters to ensure that the leakage rate through any existing seals will not impact the credited FLEX equipment or key SSCs, or alternative methods will be taken to prevent the LIP flood waters from entering through the penetrations.

5. Overall Site Flooding Response

5.1. Description of Overall Site Flooding Response

The maximum flooding elevations for the Upstream Dam Failure and the Combined Effect flooding in the Savannah River are over 40 ft below the minimum plant grade of 218.5 ft MLS (Reference 1), and are therefore bounded by the FLEX DB.

The LIP hazard will challenge the plant's ability to maintain Key Safety Functions (KSFs) during the LIP flooding event without manual actions and effective protection. During operator rounds as specified in procedure 11874-1, a severe weather check is performed to determine if rainfall is forecast above 7 Inches in the next 72 hours. When this forecast is received, operators will enter into procedure 11889-C the "Severe Weather Checklist (Reference 7)." Within this procedure, the Shift Manager (SM) will be responsible for executing 11889-C.

In the checklist 11889-C, a step directs the SM to initiate Checklist 8 when rainfall amounts are predicted to exceed 7 inches in the next 72 hours. The checklist requires monitoring of the NWS WPC 24-hour QPF Percentile Guidance for Days 1-3 at 12-hour increments. When rainfall is expected to exceed 7 inches in the next 24 hours, the remainder of the checklist is initiated. Operators will close valves 1-1215-U4-269 and 2-1215-U4-269. Then, operators are directed to fill at least 160 sandbags with 3 cubic yards of sand and transport them to the Control Building North Doors and Unit 2 DFOST.

If time permits, operators are directed to obtain an additional 104 sandbags for placement as asset protection at the Unit 2 TDAFW Pumphouse, AB South Doors, U1 & U2 CST Valve gallery doors and Unit 2 Diesel Generator Building – North and South Doors. It is not anticipated that any Key SSCs will be impacted by the LIP flood water and the plant will be able to stay in a safe stable state for the entire flood event duration.

Since there are no anticipated impacts to Key SSCs, operators will be able to respond to any additional plant challenges that arise with existing operating procedures. The FE will not focus on evaluating a routinely trained, design basis response, but rather focus on ensuring that there is an adequate site response to the flood specific actions (installing the temporary barriers). It should also but noted that through the MSA (Reference 20), it was demonstrated that the FLEX strategy (Reference 7) can be deployed during both external flooding mechanisms. This capability is also beyond the scope of the FE, but additional defense-in-depth for maintaining KSFs has been confirmed through that initiative.

5.2. Summary of Plant Modifications and Changes

VEGP identified several actions following the MSA. Although the evaluation in the MSA is not evaluating the same parameters, there is overlap in the equipment and protection required for a response to LIP in both evaluations. Updates to the following procedures were implemented for the flood response strategy:

- 11889-C, Version 26
- 11874-1, Version 85

Revisions to the procedures included clear criteria for entering the Severe Weather Procedure/Checklist, initiating increased weather monitoring, and initiating installation of sandbags to protect buildings.

In addition, the site has committed to further evaluating the penetrations below the LIP flood elevation to ensure that no bypass of the flood boundary that impact key SSC will occur during an LIP. The penetrations were identified during the Rec. 2.3 flooding walkdowns and later identified as required to complete the Flood MSA. Closeout of these penetrations will be coordinated with FLEX·modifications due to the Flood MSA. TE988003 has been issued for the completion of these required actions in this 2017 Vogtle Focused Flooding Evaluation Report.

6. Flood Impact Assessment

6.1. Dam Failure Flooding – Savannah River

6.1.1. Description of Flood Impact

As summarized in Table 4-1, the Dam Failure Flooding (plus wind-wave run-up) along the Savannah River is not bounded by the design basis for both stillwater and wind-wave run-up. The primary feature protecting the site from the reevaluated flood hazard along the Savannah River is site topography and grading. Table 6-1 provides critical plant elevations and APM for buildings housing safety-related SSCs.

Table 6-1: Summary of the Available Physical Margin

Flood Causing Mechanism	Plant Grade (ft NGVD29)	Flood Hazard Reevaluation WSE (ft NGVD29)	Available Physical Margin (ft)
Dam Failure Flooding with Maximum Wave Run-Up	219.6	178.1	41.5

6.1.2. Adequate APM Justification for Reliable Flood Protection

As demonstrated above, site grade and topography, with a nominal grade elevation of 219.6 ft, are reliable in protecting the plant from flooding along the Savannah River. The APM (41.5 ft) was determined to be adequate due to the conservative nature of the analysis for this mechanism. NRC agreed with the conclusions that VEGP FHRR demonstrated a conservative approach to calculating the potential PMF due to upstream dam failure with wind-wave run-up.

6.2. Local Intense Precipitation (LIP)

6.2.1. Description of LIP Impact

The LIP analysis, ultimately documented in the VEGP calculation X2CA91 (Reference 6), was conducted for a 6-hour 10-square mile PMP. The exterior WSEs and duration of time above the door sills is presented in Table 4-3, above. A detailed assessment of the impact on the plant is presented in the same calculation.

As described above, the maximum LIP flooding elevations are estimated to exceed the door sill elevations at the following buildings:

- Unit 1 and 2 north Control Building doors (alleyway doors);
- Unit 1 and 2 south Auxiliary Building doors;
- Unit 1 and 2 CST Valve Gallery doors;
- Unit 2 south AFW Pumphouse door (door to the Unit 2 TDAFW Pump Room); and
- Unit 2 north and south Diesel Generator Building doors.

An interior flooding analysis was performed to estimate the impact of the LIP flood waters on the following buildings and the evaluation determined the amount of water ingress was low enough to not impact the function of equipment in the following buildings:

- Unit 1 and 2 south Auxiliary Building doors;
- Unit 1 and 2 CST Valve Gallery doors;
- Unit 2 south AFW Pumphouse door (door to the Unit 2 TDAFW Pump Room); and
- Unit 2 north and south Diesel Generator Building doors

The flooding depths inside the U1 and 2 Auxiliary Buildings (ABs) was conservatively estimated ignoring the design parameter of maintaining a pressure boundary between the exterior and interior of the building. All water was assumed to flow through the 0.25 inch gap in the door and 1,550 ft^3 of water spread out throughout both ABs resulting in a flooding depth of 0.06 ft (0.77 inches) which would not affect any equipment in the AB. The estimated flooding depth inside the TDAFW pump room was conservatively calculated at 3.56 inches in Unit 2. This included all the water adjacent to the CST Valve Gallery doors ignoring the grading that would promote almost all the water to run away from the pathway to the AB sump system. The TDAFW pump sits on a pedestal that is 6 inches high and would not be affected by the flood waters.

In calculation X2CA79 (Reference 5), the following areas of the plant were identified as having penetrations that could allow water to enter buildings with Key SSCs and impact their ability to function during a LIP event. These penetrations will be evaluated and as necessary will be sealed against flooding following the completion of this FE and in coordination with the closure of Order EA-12-049.

- Unit 2 DFOS Building exterior wall
- Unit 1 and 2 NSCW Tower penetrations, and NSCW Unit 1B (West) Door
    - Flooding in the NSCW tunnels challenges Auxiliary Building penetrations
- Unit 1 and Unit 2 Main Steam Tunnels. Flooding in the Main Steam Tunnels impacts the following buildings
    - Unit 1 and Unit 2 Auxiliary Buildings
    - Unit 1 and Unit 2 Control Buildings
    - Unit 1 TDAFW Pump Room

The remaining locations with water that exceeds plant protection levels are the Unit 1 and Unit 2 Control Building North Doors and Unit 2 DFOST penetrations. Water entering these locations will affect Key SSCs, including the Station Batteries and Emergency Diesel Generators fuel supply. Temporary flood protection will be required to prevent water from challenging these ingress pathways and affecting Key SSCs.

6.2.2. Adequate APM Justification for Effective LIP Protection

As documented in Calculation X2CA91 (Reference 6), the flooding depths against these doors and penetrations are not significantly high enough and the period of inundation is not significantly long enough to challenge the Key SSCs interior to the powerblock buildings for all buildings except the Control Building the DFOST. The APM determined for the lowest Key SSC is the TDAFW in Unit 2 with 2.44 inches of APM. This is the minimum APM for any Key SSC and was determined sufficient due to the conservative assumptions used to calculate the water ingress from various sources.

The temporary protection installed to prevent water from entering the Control Building North Doors and the DFOST, that could have a maximum level of water above the opening, will provide adequate APM. Procedure 11889-C specifies a minimum height for sandbag walls greater than the maximum depth of water at the sill/penetration/scupper per Table 4-3, and that are approximately twice as high as the calculated maximum ponding depth (Maximum Depth Above Surveyed Elevation) for all doors. The APM is more than the APM for the TDAFW pumps in Unit 2, therefore, the conclusion that this is adequate remains valid.

6.2.3. Adequate Overall Site Response

This evaluation, performed in accordance with NEI 16-05 Appendix C, has demonstrated the overall site response to Local Intense Precipitation is adequate. Through updates to the strategy following the completion of the FHRR, MSA and performing calculation X2CA79 (Reference 5), minor revisions to the severe weather procedures have demonstrated the site response is effective with adequate margin. The following sections outline the results of evaluating the criteria in NEI 16-05 Appendix C.

6.2.3.1. Defining Critical Path and Identifying Time Sensitive Actions (TSAs)

The overall strategy for protecting the VEGP from Local Intense Precipitation contains relatively simple and straightforward actions. The critical path actions and TSAs have been identified during the NEI 12-06 Validation Process and performed in accordance with Appendix E of that document (Reference 20). The critical path and TSAs include:

1. Identifying a Severe Weather Event and Increased Monitoring
2. Establishing Command and Control
3. Dispatching Crews to complete 11889-C, Attachment 8

6.2.3.2. Demonstration all TSAs are Feasible

The TSAs for the VEGP's response to LIP will be validated and evaluated for feasibility prior to completing all actions associated with the external flood MSA. The guidance provided in NEI 12-06, Appendix E & G will be followed to determine that all TSAs are feasible and can be performed under the reevaluated flood hazard parameters contained in the MSFHI letter and documented in Section 4, above.

6.2.3.3. Establishing Unambiguous Procedural Triggers

The site has implemented control room rounds that include checking for a severe weather warning from the National Weather Service (NWS) once a day. If NWS has predicted more than 7 inches of rain in the next 72 hours, procedures 11889-C will be initiated (Reference 7). 11889-C directs the SM in the control room to monitor weather forecasts and 11889-C gives clear direction on determining the predicted magnitude. When more than 7 inches of rain is predicted in 24 hours or less, the SM will implement 11889-C, Attachment 8 directing operators to begin placing sandbags.

6.2.3.4. Proceduralized and Clear Organizational Response to a Flood

11889-C (Reference 7) and 11874-1 (Reference 23) provide clear guidance on the responsibilities for all groups at the station identified in Section 3.0 and Section 4.0 of the procedures, respectively.

The SM will begin implementation of both procedures. The site's Duty Manager will be responsible for implementing all aspects of the severe weather preparations outside of operations as outlined in 11874-1. The SM remains responsible for operations and the actions in 11889-C, Attachment 8. Finally, the

Work Week Manager (WWM) is responsible for coordinating activities and the flow of information from the Site Supervisors and Management.

Both procedures have been determined to have very clear guidelines for severe weather preparations and organizational response. Checklists are provided to ensure that all responsible organizations understand the actions they need to perform and the appropriate priority is given to each action.

6.2.3.5. Detailed Flood Response Timeline

The LIP Flood Response timeline will be developed following validation of TSAs for feasibility under the external flood MSA and in accordance with the schedule developed for its completion. The guidance provided in NEI 12-06, Appendix E & G will be followed to determine that all timelines are feasible and can be performed under the reevaluated flood hazard parameters.

6.2.3.6. Accounting for the Expected Environmental Conditions

The environmental conditions expected during the deployment of the sandbags are expected to be nominal. Advanced warning of a storm will provide sufficient time to have the sandbags installed prior to the onset of severe weather. Given the short amount of time expected to complete the action, it is highly unlikely that conditions will deteriorate enough to impede installing the flood protection.

In addition, there are only two locations that require the placement of sandbag walls and these locations are given first priority. The time it would take to complete the actions is relatively short compared to the overall warning time and therefore, it is not anticipated that extreme weather conditions would arise that quickly to preclude completing the actions in the time window available.

6.2.3.7. Demonstration of Adequate site response

The VEGP response to the LIP flood is adequate based upon the procedure changes outlined in Section 5.2, above. The guidance provided in NEI 12-06, Appendix E & G will be followed to determine that VGEP response is feasible and can be performed under the reevaluated flood hazard parameters.This will occur in conjunction with completing the Flood MSA process for external flooding.

7. Conclusion

The overall conclusion of this Focused Evaluation is that all flooding mechanisms reevaluated for VEGP have effective protection and an adequate site response for key SSCs that are responsible for maintaining KSFs for the entire flood event duration. The completion of the modifications identified in Section 5.2 will ensure that KSFs remain available during an external flood event, and will be coordinated with the completion of the external flood MSA. As confirmed by the MSA, mitigating strategies (FLEX) will also be available during both flooding mechanisms, providing an additional level of defense-in-depth beyond normally installed plant equipment.

The reevaluated Dam Failure Flooding mechanism (with wind-wave run-up) along the Savannah River is not bounded by the design basis for both stillwater and wind-wave run-up. The primary feature protecting the site from the reevaluated flood hazard along the Savannah River is the site's topography and grading. The FIAP, specifically a Path 2 Focused Evaluation, resulted in finding that the site's topography and grading provide effective flood protection against the applicable flood parameters, including associated effects, with adequate APM (41.5 ft).

The reevaluated LIP flood mechanism is also not bounded by the design basis of the plant. Flooding from LIP is estimated to cause flood depths in excess of the door thresholds and plant grade surveyed at 219.6 ft. As outlined in the sections above, temporary protection will be required for the Unit 1 and 2 Control Building North doors to prevent water from affecting the station batteries and penetrations in the Unit 2 DFOST building to ensure continued operation of the emergency diesel generators. All other buildings with water levels exceeding the door thresholds have been shown to be able to accommodate in leakage where water accumulation will not be sufficient enough to affect any Key SSCs. An internal flood study was performed and the most limiting APM value was conservatively calculated as 2.44 inches in the Unit 2 TDAFW pump room.

It was demonstrated that VEGP has an adequate site response to the LIP mechanism. For areas that require temporary protection, this evaluation demonstrated that the revised severe weather procedures clearly identify critical action steps to implement the necessary protection features maintaining Key SSCs for the entire flood event duration. Additional evaluation will be required to develop the detailed flood response timeline and validate the TSAs as feasible using the guidance provided in NEI 12-06, Appendix E & G. These actions will be coordinated with the completion of the external flooding MSA.

This submittal completes the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter without the need for the NRC staff to perform Phase 2 decision making per JLD-ISG-2016-01 and NEI 16-05.

8. References

1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident; dated March 12, 2012.
2. Southern Nuclear Operating Company (2013). Flooding Hazard Reevaluation Report. Vogtle Electric Generating Plant Units 1 & 2, Report Number SNC453475, Revision 0, March 4, 2013.
3. U.S. Nuclear Regulatory Commission (2014). Staff Assessment by the Office of Nuclear Reactor Regulation Related to Flooding Hazard Reevaluation Report, Near-Term Task Force Recommendation 2.1 Related to the Fukushima Dai-Ichi Nuclear Power Plant Accident, Vogtle Electric Generating Plant, Units 1 and 2, Docket Nos. 50-424 and 50-425. Transmitted on November 6, 2014.
4. U.S. Nuclear Regulatory Commission (2015). Supplement to Staff Assessment by the Office of Nuclear Reactor Regulation Related to Flooding Hazard Reevaluation Report, Near-Term Task Force Recommendation 2.1 Related to the Fukushima Dai-Ichi Nuclear Power Plant Accident, Vogtle Electric Generating Plant, Units 1 and 2, Docket Nos. 50-424 and 50-425. Transmitted on November 3, 2015.
5. Southern Nuclear Operating Company (2013). Calculation X2CA79 - Marker Measurements to Determine Floor Elevation of Selected Safety Related Structures. Vogtle Electric Generating Plant Units 1 & 2, Version 1, February 20, 2013.
6. Southern Nuclear Operating Company (2016). X2CA91 - Local Intense Precipitation Maximum Flooding Elevation.
7. Southern Nuclear Operating Company (2017). 11889-C - Severe Weather Checklist. Version 26.
8. Southern Nuclear Operating Company (2014). NMP-OS-017 - Severe Weather. Version 1.1.
9. Southern Nuclear Operating Company (2016). Final Integrated Plan U.S. Nuclear Regulatory Commission Order Ea-12-049 Strategies For Beyond Design Basis External Events, Final Integrated Plan U.S. Nuclear Regulatory Commission Order Ea-12-049 Strategies For Beyond Design Basis External Events
10. Southern Nuclear Operating Company (2014). Fukushima NTTF 2.3 Flooding Walkdown – NEI FAQ 030: Penetration APM Reevaluation. RER SNC426077. Attachment C.
11. Nuclear Energy Institute (NEI), Report NEI 12-06, Rev. 2 (2015), Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, dated December 2015.
12. NRC Letter, Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 1, 2013.
13. Letter from David L. Skeen, U.S. Nuclear Regulatory Commission, to Joseph E. Pollock, Nuclear Energy Institute – Trigger Conditions for Performing an Integrated Assessment and Due Date for Response, dated December 3, 2012.
14. U.S. Nuclear Regulatory Commission, JLD-ISG-2012-05, Guidance for Performing the Integrated Assessment for External Flooding, dated November 30, 2012.

15. COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards", dated November 21, 2014.

16. NRC Staff Requirements Memoranda to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards", dated March 30, 2015.

17. NRC Letter, Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events, dated September 1, 2015.

18. Nuclear Energy Institute (NEI), Report NEI 16-05 [Rev 1], External Flooding Assessment Guidelines, dated June 2016.

19. U.S. Nuclear Regulatory Commission, JLD-ISG-2016-01, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment, Revision 0, dated July 11, 2016.

20. Southern Nuclear Operating Company (2016). Mitigating Strategies Assessments for Flooding (Vogtle Electric Generating Plant), dated December 19, 2016.

21. Southern Nuclear Operating Company (2012). Vogtle Electric Generating Plant Units 1 & 2, Final Safety Analysis Report. Revision 18, September 12, 2012.

22. U.S. Nuclear Regulatory Commission, NUREG/CR-7046, Design-Basis Flood Estimate for Site Characterization at Nuclear Power Plants in the United States of America, dated November 2011

23. Southern Nuclear Operating Company (2017). 11874-1- Control Room Rounds Sheets. Version 85.

24. U.S. Nuclear Regulatory Commission (2015). Coordination Of Requests For Information Regarding Flooding Hazard Reevaluations And Mitigating Strategies For Beyond-Design-Basis External Events (ML15174A257).

Vogtle Electric Generating Plant – Units 1 and 2
Flooding Focused Evaluation Summary Report

Enclosure 2

VEGP Regulatory Commitments

The following table identifies those actions committed by VEGP in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
As discussed in the VEGP Flooding MSA (Reference 7), VEGP will revise procedures to ensure that the LIP flood waters do not enter through the Control Building doors and that the flooding pathways identified in NMP-ES-050-F01, "SAM Flood Protection Features Evaluation for Beyond Design Basis Local Intense Precipitation Event," do not pose a challenge for the Key SSCs ability to perform their function.[1]	X		December 31, 2019 or two years following the effective date of 10 CFR 50.155, whichever is latest.
As discussed in the VEGP Flooding MSA (Reference 7), VEGP will evaluate penetrations identified as providing a potential pathway for the LIP flood waters to ensure that the leakage rate through any existing seals will not impact Key SSCs. Enhancements (modifications and/or procedures) will be implemented to prevent the LIP flood waters from entering through the penetrations if impacts to Key SSCs are determined. [1]	X		December 31, 2019 or two years following the effective date of 10 CFR 50.155, whichever is latest.

1- Per Reference 3, ..." Where additional measures are necessary to protect against a flooding mechanism, licensees may include in their submittals regulatory commitments to implement procedural or hardware changes."